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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,082	03/31/2004	Alexander L. Gaeta	SP03-046	7341

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CORNING INCORPORATED
SP-TI-3-1
CORNING, NY 14831

EXAMINER

DUPUIS, DEREK L

ART UNIT	PAPER NUMBER
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2883

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/815,082

Applicant(s)

GAETA ET AL.

Examiner

Derek L. Dupuis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 12-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 12-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see page 6, in combination with the amendment to the claims filed 12/6/2006, with respect to the rejection of claim 24 under 35 U.S.C. 112 have been fully considered and are persuasive. The rejection of claim 24 under 35 U.S.C. 112 has been withdrawn.
2. Applicant's arguments filed 12/4/2006 have been fully considered but they are not persuasive. In page 7, applicant argues that Kawanishi does not disclose an optical fiber with a loss of about 0.01 dB/km. The examiner respectfully disagrees. Kawanishi anticipates an optical fiber with a loss of about 0.01 dB/km and the examiner believes that the disclosure is fully enabled. Applicant's statement that the disclosure is not enabled is unsupported and does not constitute evidence that the enablement requirement for the reference was not met.
3. In pages 7 and 8, applicant argues that the limitation of having a nonlinear refractive index less than $10^{-18} \text{ cm}^2/\text{W}$ is not obvious. The examiner disagrees. The references teach the desirability of having a near-zero nonlinear refractive index. The references also teach achieving this index by using air filled holes to guide the optical energy in the PBG fibers. Applicant's own disclosure identifies the nonlinear refractive index of air to be $2.9 \times 10^{-19} \text{ cm}^2/\text{W}$ which is within the claimed range.
4. In page 7, applicant argues that Libori does not disclose or render obvious a loss of less than 300 dB/km. The examiner respectfully disagrees. Libori et al disclose that a low loss is desirable (see column 10, lines 38-55) and can be achieved using a PGB structure in the cladding. It would have been obvious to one of ordinary skill in the art at the time of invention

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to have a loss less than 20 dB/km since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 4, 6-8, 13, 15, 17, 18, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kawanishi et al (US 6,404,966 B1)*.

7. Kawanishi et al teach an optical fiber for the transmission of optical energy comprising a cladding region (2) including a photonic band gap structure, the optical energy having a wavelength within the photonic band gap structure. The fiber also includes a core region (1) surrounded by the photonic band gap structure. The photonic band gap structure guides the optical energy substantially within the core region with a loss of about 0.01 dB/km which is less than the claimed ranges of less than 300 dB/km, less than 200 dB/km, less than 50 dB/km, and less than 20 dB/km (see column 3, lines 25-43).

8. Kawanishi et al also teach that the optical fiber includes a hollow core filled with air, which is a gaseous material (see column 3, lines 25-35). Air has a nonlinear refractive index of $2.9 \times 10^{-19} \text{ cm}^2/\text{W}$ which is within the claimed range. The fiber is manufactured using a stack and draw method (see column 6, lines 34-42). Figure 3 also shows that the core has a diameter that is less than 4 times the pitch of the band gap structure.

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9. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP 2144.05.

10. Kawanishi et al also teach that the optical fiber can be used to transmit pulses (see column 1, lines 60-63). As discussed above, the low non-linear refractive index results in minimal pulse spreading. Therefore, the pulse will retain its shape. Pulses such as these are solitons. One of ordinary skill in the art recognizes the benefit and desirability of high power signals. It would have been obvious to one of ordinary skill in the art at the time of invention to use an optical soliton pulse having a peak power of 3 MW since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

11. Claims 1-3, 5, 6-10, 13, 14, 16-18, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Libori et al (US 6,792,188 B2)*.

12. Libori et al teach an optical fiber for the transmission of optical energy comprising a cladding region including a photonic band gap structure, the optical energy having a wavelength within the photonic band gap of the photonic band gap structure and a core region surrounded by the photonic band gap structure as shown in figure 2. The photonic band gap fiber has low material losses (see column 10, lines 38-55). Libori et al also teach that the core region can have a lower refractive index than the average refractive index of the photonic band gap structure (see figure 16). Libori et al also teach that the optical energy can have a wavelength between 1000 nm and 2400 nm (see figure 5) which overlaps with the claimed ranges of between 150 nm and

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11,000 nm, greater than 1000 nm, between 1400 nm and 1500 nm, and between 1680 nm and 1900 nm. Libori et al also teach that the dispersion is greater than 20 ps/nm/km as seen in figure 5 and that the fiber is capable of carrying multiple modes. As shown in figures 1 and 2, the core has a diameter that is less than 4 times the pitch of the PGB structure. Libori et al teach that the PBG structure can include air holes. Air has a nonlinear refractive index of $2.9 \times 10^{-19} \text{ cm}^2/\text{W}$ which is within the claimed range.

13. In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP 2144.05.

14. Libori et al discloses the claimed invention except for explicitly teaching that the loss is less than 20 dB/km. Libori et al disclose that a low loss is desirable (see column 10, lines 38-55) and can be achieved using a PGB structure in the cladding. It would have been obvious to one of ordinary skill in the art at the time of invention to have a loss less than 20 dB/km since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

15. Libori et al also teach that the optical fiber can be used to transmit solitons (see column 1, lines 13-20). One of ordinary skill in the art recognizes the benefit and desirability of high power signals. It would have been obvious to one of ordinary skill in the art at the time of invention to use an optical soliton pulse having a peak power of 3 MW since it has been held that

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where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

16. Claims 1, 4, 6, 7, 12, 15, 19, 20, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Fajardo et al (US 6,444,133 B1)*.

17. Fajardo et al teach an optical fiber for the transmission of optical energy comprising a cladding region including a PBG structure, the optical energy having a wavelength within the photonic band gap of the PBG structure. The fiber also includes a core region surrounded by the PBG structure and that the core can be air. Fajardo et al also teach that the fiber can be made using a stack and draw method. (see abstract, and column 1, lines 26-65 and column 2, lines 30-42).

18. Fajardo et al discloses the claimed invention except for explicitly teaching that the loss is less than 50 dB/km. Fajardo et al disclose that a low loss and a near zero nonlinear refractive index is desirable (see column 1, lines 56-65) and can be achieved using a PGB structure in the cladding. It would have been obvious to one of ordinary skill in the art at the time of invention to have a loss less than 50 dB/km and a nonlinear refractive index less than $5 \times 10^{-19} \text{ cm}^2/\text{W}$ since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Furthermore, Fajarado teaches that the PGB structure can include air voids. Air has a nonlinear refractive index of $2.9 \times 10^{-19} \text{ cm}^2/\text{W}$ which is within the claimed range.

19. Fajardo et al also teach that the optical fiber can be used to transmit pulses (see column 1, lines 13-20). As discussed above, the low non-linear refractive index results in minimal pulse spreading. Therefore, the pulse will retain its shape. Pulses such as these are solitons. One of

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ordinary skill in the art recognizes the benefit and desirability of high power signals. It would have been obvious to one of ordinary skill in the art at the time of invention to use an optical soliton pulse having a peak power of 3 MW since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

20. Claims 21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Fajardo et al (US 6,444,133 B1)* as applied to claims 1, 4, 6, 7, 12, 15, 19, 20, 22, and 23 above, and further in view of *Libori et al (US 6,792,188 B2)*.

21. Fajardo et al teach an optical fiber as discussed above. Fajarado et al do not explicitly teach that the fiber is configured to support a temporal soliton having a peak power of at least 1 MW. Libori et al also teach that optical fibers are routinely used transmit solitons (see column 1, lines 13-20).

22. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the fiber of Fajarado et al to support solitons as taught by Libori et al. Motivation would be to add functionality to the fiber and to enable it for additional optical communications (see column 1, lines 13-20 of Libori).

23. One of ordinary skill in the art recognizes the benefit and desirability of high power signals. It would have been obvious to one of ordinary skill in the art at the time of invention to use an optical soliton pulse having a peak power of 3 MW since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Conclusion

24. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek L. Dupuis whose telephone number is (571) 272-3101. The examiner can normally be reached on Monday - Friday 8:30am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Derek L. Dupuis
Group Art Unit 2883

K. CYRUS KIANNI
PRIMARY PATENT EXAMINER

A handwritten signature in black ink, appearing to read 'K. CYRUS KIANNI', followed by a long horizontal line extending to the right.